METHODS AND APPARATUS FOR FORMING DIELECTRIC STRUCTURES IN INTEGRATED CIRCUITS

ABSTRACT OF THE DISCLOSURE

In some embodiments, a multi-layer dielectric structure, such as a capacitor dielectric region, is formed by forming a first dielectric layer on a substrate according to a CVD process and forming a second dielectric layer directly on the first dielectric layer according to an ALD process. In further embodiments, a multi-layer dielectric structure is formed by forming a first dielectric layer on a substrate according to an ALD process and forming a second dielectric layer directly on the first dielectric layer according to a CVD process. The CVD-formed layers may comprise one selected from the group consisting of SiO₂, Si₃N₃, Ta₂O₅, HfO₂, ZrO₂, TiO₂, Y₂O₃, Pr₂O₃, La₂O₃, Nb₂O₅, SrTiO₃ (STO), BaSrTiO₃ (BST) and PbZrTiO₃ (PZT). The ALD-formed layers may comprise one selected from the group consisting of SiO₂, Si₃N₃, Al₂O₃, Ta₂O₅, HfO₂, ZrO₂, TiO₂, Y₂O₃, Pr₂O₃, La₂O₃, Nb₂O₅, SrTiO₃ (STO), BaSrTiO₃ (BST) and PbZrTiO₃ (PZT).

5

10